

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025***Fourth Semester**Chemical Engineering***PC3352 - Mechanical Operations***Regulations - 2021**Duration : 3 Hrs**Maximum : 100 Marks***PART - A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Differentiate between Ideal and actual screens considering effectiveness.	L2	1	2
2.	Define mesh and screen aperture.	L1	1	2
3.	Classify the size reduction equipment.	L2	2	2
4.	Define work index. Give the mathematical expression and explain the terms.	L2	2	2
5.	What is meant by terminal settling velocity.	L1	3	2
6.	Give the principle of cyclone separator.	L1	3	2
7.	Define Stoke's law.	L1	4	2
8.	Give the function of thickener.	L2	4	2
9.	Draw the flow pattern while mixing takes place in an unbaffled tank.	L2	5	2
10.	List four equipment used for horizontal transportation of material.	L1	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a Derive an expression to find overall effectiveness of a screen. Explain the method in stepwise to represent the data on graph based on the cumulative method.	L4	1	16
	Or			
	b From the following screen analysis data, determine the average diameter of the particles by volume surface mean diameter method.	L4	1	16

Bss. No	Dpi(mm)	Mass on screen(g)
3	6.7	00
4	4.699	1
6	3.327	1.5
8	2.362	4.0
10	1.651	1.5
14	1.168	1.2
20	0.833	0.5
Pan	00	3.5

12. a Explain the working principle and construction of a jaw and roll crusher with a neat diagram showing design and principle of operation. L3 2 16
Or
b Calculate the operating speed of ball mill from the following data: L3 2 16
Diameter of the mill – 500mm
Diameter of balls – 50mm
Operating speed is 40% of critical speed
13. a Obtain an expression to find terminal settling velocity of particles settling under gravitational force. Give the criterion for settling regimes in Stoke's law region. State the assumptions made. L3 3 16
Or
b Define specific gravity. What will be the settling velocity of spherical steel particles having 0.038 cm diameter, settling in an oil of specific gravity 0.82 and viscosity of 0.1 poise. Density of steel particles=7.87 g/cc. L3 3 16
14. a Explain the working of an industrial thickener with a neat diagram. L3 4 16
Or
b Laboratory filtrations conducted at constant pressure (46196.5N/m^2) on slurry of calcium carbonate in water gave the data as given below. The filter area and mass of solids per unit volume of filtrate were 0.044 m^2 and 23.5 kg/m^3 . Filtration was carried out at temperature of 25°C . Given viscosity of filtrate = 0.886 cp , estimate the values of filter medium resistance and cake resistance. L3 4 16
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|--------------------------|------|------|------|-------|-------|-------|
| Filtrate volume in liter | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| Time in s | 17.3 | 41.1 | 72.0 | 108.3 | 152.1 | 201.7 |
15. a Describe the methods adopted in industry for storage of solids. Explain both open and closed storage techniques. L3 5 16
Or
b Describe the working principle and construction of internal screw mixer with a neat diagram showing internal design of equipment. L3 5 16